REMARKS

The Office action has been carefully considered. The Office action rejected claims 1-6 and 8-18 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,809,328 to Nogales et al. ("Nogales"). Further, the Office action objected to claims 7, 19, and 20 as being based on a rejected independent claims but would be allowable if rewritten in independent form to include all of the limitations of any intervening claims. Applicants thank the Examiner for indication of allowable subject matter and respectfully disagree with the rejections.

By present amendment, claims 3, 4,13, and 19 have been amended for grammatical error and clarification and not in view of the prior art. Applicants submit that the claims as filed were patentable over the prior art of record, and that the amendments herein are for purposes of clarifying the claims and/or for expediting allowance of the claims and not for reasons related to patentability. Reconsideration is respectfully requested.

Prior to discussing reasons why applicants believe that the claims in this application are clearly allowable in view of the teachings of the cited and applied references, a brief description of the present invention is presented.

The present invention is directed to system and method for implementing control logic using data structure management, as opposed to finite state machines, to manipulate the inbound and outbound data streams in a fibre channel. As such, a fibre channel interface according to the present invention converts data streams from one data structure to another, and, the manner in which the fibre channel manipulates the data stream is one aspect of the present invention that is novel.

It is well known in the art that fibre channels are used as a communications interface between a computer-level bus architecture and a data transmission-level network. When such a fibre channel is used, data streams that are received from the network typically comprise a serial communication. The fibre channel is able to convert the received serial data stream into a parallel data stream that is suitable for transmission onto a computer bus, such as a PCI bus. Likewise, when data streams are to be sent from the fibre channel to a remote location on the network, the parallel data stream from the computer bus is converted to a serial data stream suitable for transmission on the network. In the past, this conversion has been performed by devices such as fibre channel interfaces using complex finite state machines within an interface controller. A good example of such a conventional fibre channel interface is the subject matter of the teachings of the cited and applied reference, Nogales.

Embodiments of the present invention, however, are not directed to a simple fibre channel interface controller having finite state machines as disclosed in Nogales. Rather, a fibre channel interface according to the present invention utilizes a controller having a number of subcontrollers, called managers, to distinguish between different "contexts" in which data may be received by the fibre channel interface. A context describes a task or thread that is processed by the controller and is a fundamental unit of task management for the controller. Thus, each manager is provided with a particular data structure to store individual contexts. This relationship can be likened somewhat to classes (managers having data structures) and instances (data in contexts) in object-oriented programming.

When data (typically in a format called outbound descriptor block) is received as part of a data sequence at the outbound sequence manager (OSM) of the fibre channel interface, the appropriate manager is called upon to process the data in context according to its particular data structure. Then, when the data is required for a different purpose, such as transmission to a remote node on the network, the data (now stored in a first data structure) may be transferred to a different context (*i.e.* a second data structure) by simple data manipulation as opposed to running the data through a complex finite state machines as has been done in the past.

Note that the above description is for example and informational purposes only, and should not be used to interpret the claims, which are discussed below.

Turning to the claims, independent claim 1 recites a method for implementing a hardware controller that concurrently executes a number of tasks by carrying out operations on behalf of the tasks, the method comprising determining a format for a context, comprising stored information related to a task, that represents the task, determining possible states, and transitions between states, that a context representing a task currently executed by the hardware controller can occupy at each point in the execution of the task, transitions representing operations performed on behalf of a task by the hardware controller, partitioning the states and operations carried out by the hardware controller into a number of managers each containing a number of related states and carrying out a number of operations associating each manager with a data structure for storing contexts occupying states contained by the manager, defining a data-structure-manipulator manager that implements

the data structures and that transfers contexts from one data structure to another, defining a command interface to the data-structure-manipulator manager for each manager, and implementing the managers and data-structure-manipulator manager, according to the determined states and transitions, so that, when a first manager carries out an operation that results in transition of a context to a state contained in a second manager, the first manager generates a command to the data-structure-manipulator manager to transfer the context from the data structure associated with the first manager to the data structure associated with the second manager.

The Office action rejected claim 1 as unpatentable over Nogales. More specifically, the Office action contends that Nogales teaches determining a format for a context, comprising stored information related to a task, that represents the task. Column 6, lines 29-33 of Nogales are referenced. Further, the Office action contends that Nogales teaches determining possible states, and transitions between states, that a context representing a task currently executed by the hardware controller can occupy at each point in the execution of the task, transitions representing operations performed on behalf of a task by the hardware controller. Column 6, line 34 of Nogales is referenced. Still further, the Office action contends that Nogales teaches associating each manager with a data structure for storing contexts occupying states contained by the manager. Column 5, lines 7-13 of Nogales are referenced. Further yet, The Office action contends that Nogales teaches defining a data-structure-manipulator manager that implements the data structures and that transfers contexts from one data structure to another and defining a command interface to the data-structure-manipulator manager for each manager. Column 6, lines

42-57 of Nogales are referenced. The Office action also contends that Nogales teaches implementing the managers and data-structure-manipulator manager, according to the determined states and transitions, so that, when a first manager carries out an operation that results in transition of a context to a state contained in a second manager, the first manager generates a command to the data-structure-manipulator manager to transfer the context from the data structure associated with the first manager to the data structure associated with the second manager. Column 6, lines 21-57 of Nogales are referenced.

The Office action acknowledges that Nogales fails to teach partitioning the states and operations carried out by the hardware controller into a number of managers each containing a number of related states and carrying out a number of operations. However, the Office action contends that it is well known in the art to group related states together with a manager because it simplifies work for the manager. The Office action then concludes that the recitations of claim 1 are not patentable over the teachings of Nogales. Applicants respectfully disagree.

As briefly mentioned above, the cited and applied reference, Nogales, teaches, generally, a fibre channel interface used as a communications interface between a computer-level bus architecture and a data-transmission-level network. As such, the system and method taught by Nogales utilizes a fibre channel controller (31) and the main processor (22) of the host to control the manipulation of data in shared registers in buffer memory (30). See column 6, lines 42-57 of Nogales. In the case of a write command, the fibre channel controller reads the data from the shared register and sends the data to a gigabit link module (GLM, 32) for processing from one data structure (PCI bus

architecture) to a another data structure (serial bus or network architecture). In the case of a read command, the processor reads the data from the shared buffers and directs the data to internal destinations accordingly. See column 6, lines 58-67 of Nogales. Nogales, however, is completely silent as to how the data stored in the buffer memory is transformed from one data structure to another when outbound data is sent to the GLM or received from the GLM. That is, Nogales does not show any cognition, let alone teach a particular manner in which parallel to serial conversions of data take place. Thus, by convention, Nogales likely uses one or more finite state machines in the GLM to accomplish the conversion from one data structure to the next as is the case with the above-mentioned prior art; one of the very problems that that the present invention is aimed at solving.

The present invention, in stark contrast, is directed to a particular manner for accomplishing this conversion of data from one data structure to another which is clearly recited in the claim 1. Specifically, claim 1 recites a number of managers each containing a number of related states and carrying out a number of operations and implementing the managers, according to the determined states, so that, when a first manager carries out an operation that results in transition of a context to a state contained in a second manager, the first manager generates a command to the data-structure-manipulator manager to transfer the context from the data structure associated with the first manager to the data structure associated with the second manager. That is, because the data is stored in a context within a data structure associated with a first manager, a data-structure-manipulator manager is able to quickly and easily convert the actual stored data (*i.e.,* the context) from the first data structure to a

second data structure without the need for complex logic paths such as finite state machines of the past.

Further, claim 1 recites determining a format for a context, comprising stored information related to a task, that represents the task. Significantly, Nogales does not teach nor does it even show any awareness of the concept of a context that represents a format for storing information related to a task as well as its execution state and/or current operation. At best, Nogales teaches a data structure (PCI bus or network architecture) for storing static information and is completely silent as to what operational state in which the static information may be. Simply stated, Nogales does not teach a context.

Still further, claim 1 recites determining possible states, and transitions between states, that a context representing a task currently executed by the hardware controller can occupy at each point in the execution of the task, transitions representing operations performed on behalf of a task by the hardware controller. Again, Nogales does not teach the concept of contexts, thus Nogales cannot possibly teach determining possible states and transitions between states that a context can occupy.

Further yet, claim 1 recites associating each manager with a data structure for storing contexts occupying states contained by the manager. Again, Nogales shows no cognition of the concept of contexts, thus, Nogales cannot possibly teach associating managers with a data structure for storing contexts, let alone the specific data structures that correspond to particular states in which the contexts may be, which are also, in turn, associated with the managers.

Nogales falls significantly short of teaching all of the recitations of claim 1. Further, Nogales fails to teach several key recitations of claim 1 such that it would simply have not been possible for one skilled in the art at the time the invention was made to have taken the teachings of Nogales and modified them such that the recitations of claim 1 would have been obvious. There is no teaching in Nogales, or even any motivation, to modify the teachings of Nogales, because the system and method taught by Nogales features conventional technology that is part and parcel with the problems described in the background of the present invention, *i.e.,* the use of finite state machines.

Bear in mind that, as a matter of law, obviousness may not be established using hindsight obtained in view of the teachings or suggestions of the applicants. *W.L. Gore & Assocs., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1551, 1553, 220 USPQ 303, 311, 312-13 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984). To guard against the use of such impermissible hindsight, obviousness needs to be determined by ascertaining whether the applicable prior art contains any suggestion or motivation for making the modifications in the design of the prior art article in order to produce the claimed design. The mere possibility that a prior art teaching could be modified or combined such that its use would lead to the particular limitations recited in a claim does not make the recited limitation obvious, unless the prior art suggests the desirability of such a modification. *See In re Gordon*, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984).

Applicants submit that claim 1 is allowable over the prior art of record for at least the foregoing reasons.

Applicants respectfully submit that dependent claims 2-7, by similar analysis, are also allowable. Each of these claims depends either directly or indirectly from claim 1 and consequently includes the recitations of independent claim 1. As discussed above, Nogales fails to disclose the recitations of claim 1 and, therefore, these claims are also allowable over the prior art of record. In addition to the recitations of claim 1 noted above, each of these dependent claims includes additional patentable elements.

For example, claim 5 recites wherein related contexts can be linked to one another to form a chain of related contexts that can be transferred together by transferring the first context of the chain of related contexts. As was discussed above, Nogales does not teach, nor is even cognizant of the concept of contexts as recited in claims 1 and 5. Thus, Nogales cannot possibly teach a chain of related contexts.

Turning to the next independent claim, claim 8 recites a method for implementing a hardware controller that concurrently executes a number of tasks, the method comprising representing each task executed by the hardware controller as a context, each context occupying a state determined by the contents of at least one field within the context, a context transitioning from one state to another state when the hardware controller carries out an operation on behalf of the task represented by the context, partitioning hardware controller operations and associated context states into a number of logical managers, associating each logical manager with one of a number logical data structures for storing contexts occupying states within the logical manager, and implementing the logical managers and a data-structure manipulator that contains the contexts, logical data structures, and a command interface through

which each logical manager issues commands to direct the data-structure manipulator to transfer a context from the data structure associated with the logical manager to a different data structure.

The Office action rejected claim 8 as being unpatentable over Nogales for the same reasons as given in the rejection of claim 1. Applicants respectfully disagree.

As was discussed above, Nogales does not teach, nor is even cognizant of the concept of contexts as recited in claim 8. Thus, Nogales cannot possibly be construed to teach the recitations of claim 8 such as each context occupying a state determined by the contents of at least one field within the context, a context transitioning from one state to another state, partitioning hardware controller operations and associated context states into a number of logical managers, associating each logical manager with one of a number logical data structures for storing contexts occupying states within the logical manager, and implementing the logical managers and a data-structure manipulator that contains the contexts.

Applicants submit that claim 8 is patentable over the prior art of record for at least the foregoing reasons.

Applicants respectfully submit that dependent claims 8-12, by similar analysis, are also allowable. Each of these claims depends either directly or indirectly from claim 8 and consequently includes the recitations of independent claim 8. As discussed above, Nogales fails to disclose the recitations of claim 8 and, therefore, these claims are also allowable over the prior art of record. In addition to the recitations of claim 8 noted above, each of these dependent claims includes additional patentable elements.

Turning to the last independent claim, claim 13, as amended, recites a subcomponent controller within a communication controller comprising data storage elements that together compose a number of contexts for storing information related to a sequence of data to be exchanged through a communications medium connected to the communication controller, logical managers that are each associated with a data structure and that each carries out operations on behalf of contexts stored within the associated data structure, and a data-structure manipulator that implements a number of data structures for storing contexts and that transfer contexts between data structures in response to receiving transfer commands from the logical managers.

The Office action rejected claim 13 as being unpatentable over Nogales. More specifically, the Office action contends that Nogales teaches data storage elements that together compose a number of contexts for storing information related to a sequence of data to be exchanged through a communications medium connected to the communication controller. Column 6, lines 47-57 of Nogales are referenced. Further, the Office action contends that Nogales teaches logical managers that are each associated with a data structure and that each carries out operations on behalf of contexts stored within the associated data structure. Column 6, lines 29-34 of Nogales are referenced. Finally, with respect to claim 13, the Office action contends that Nogales teaches a data-structure manipulator that implements a number of data structures for storing contexts and that transfer contexts between data structures in response to receiving transfer commands from the logical managers. Column 6, lines 42-57 of Nogales are referenced. Applicants respectfully disagree.

As was discussed above, Nogales does not teach, nor is even cognizant of the concept of contexts as recited in claim 13. Thus, Nogales cannot possibly be construed to teach the recitations of claim 13 such as data storage elements that together compose a number of contexts for storing information, logical managers that are each associated with a data structure and that each carries out operations on behalf of contexts, and data-structure manipulator that implements a number of data structures for storing contexts and that transfer contexts.

Applicants submit that claim 13 is patentable over the prior art of record for at least the foregoing reasons.

Applicants respectfully submit that dependent claims 14-20, by similar analysis, are also allowable. Each of these claims depends either directly or indirectly from claim 13 and consequently includes the recitations of independent claim 13. As discussed above, Nogales fails to disclose the recitations of claim 13 and, therefore, these claims are also allowable over the prior art of record. In addition to the recitations of claim 13 noted above, each of these dependent claims includes additional patentable elements.

For at least the forgoing reasons, applicants submit that all the claims are patentable over the prior art of record. Reconsideration and withdrawal of the rejections in the Office Action is respectfully requested and early allowance of this application is earnestly solicited.

CONCLUSION

In view of the foregoing remarks, it is respectfully submitted that claims 1-20 are patentable over the prior art of record, and that the application is good and proper form for allowance. A favorable action on the part of the Examiner is earnestly solicited.

If in the opinion of the Examiner a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney at (425) 822-3668.

Respectfully submitted,

Kevin D. Jablonski, Reg. No. 50,401
Attorney for Applicants
Law Office of Kevin D. Jablonski
218 Main St. #218
Kirkland, WA 98033
(425) 822-3668
(425) 822-3526 (facsimile)